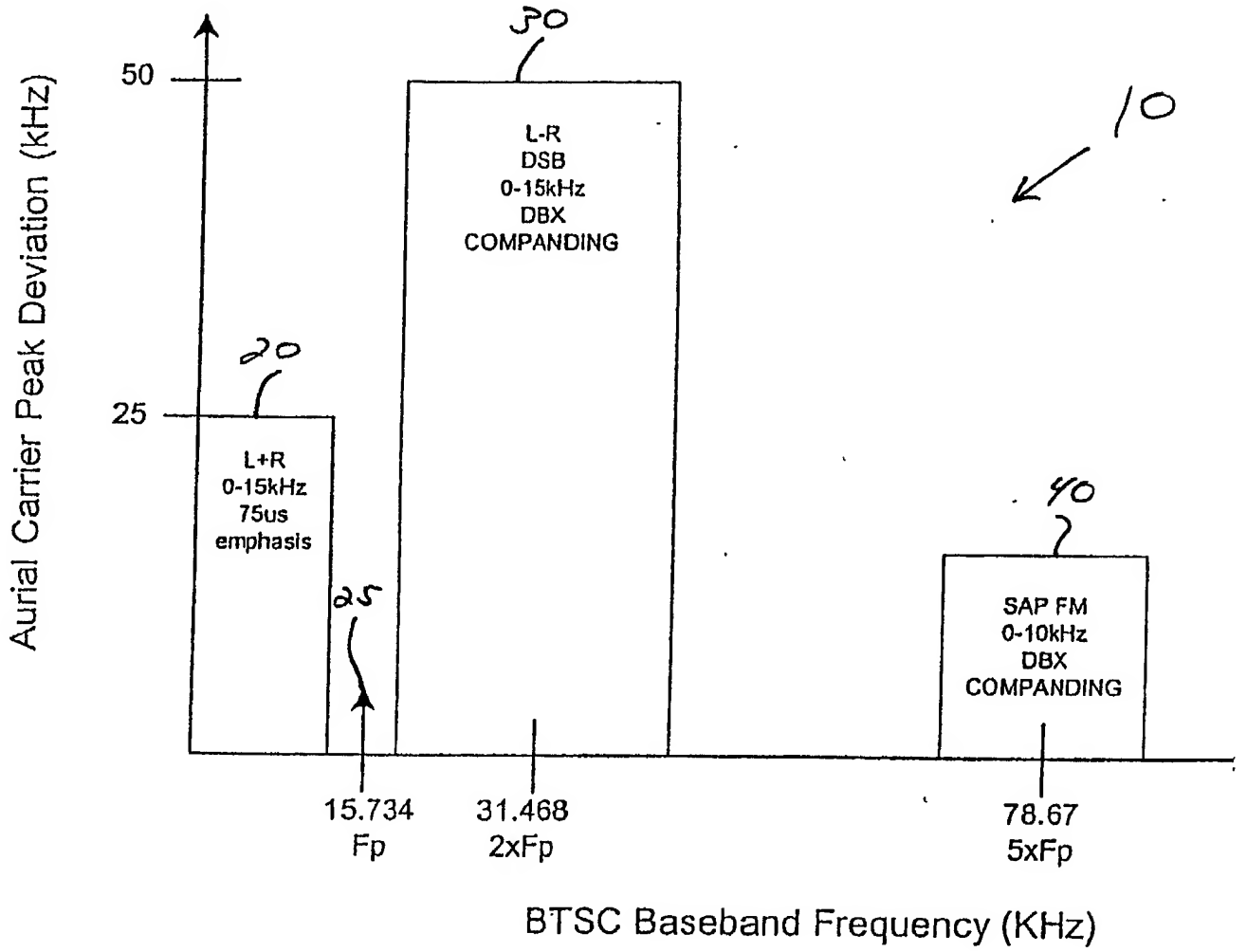
FIG. 1


10
30
50
L-R
DSB
0-15kHz
DBX
COMPANDING
20
25
L+R
0-15kHz
75us
emphasis
25
40
SAP FM
0-10kHz
DBX
COMPANDING
Aurial Carrier Peak Deviation (kHz)
15.734
Fp
31.468
2xFp
78.67
5xFp
BTSC Baseband Frequency (KHz)

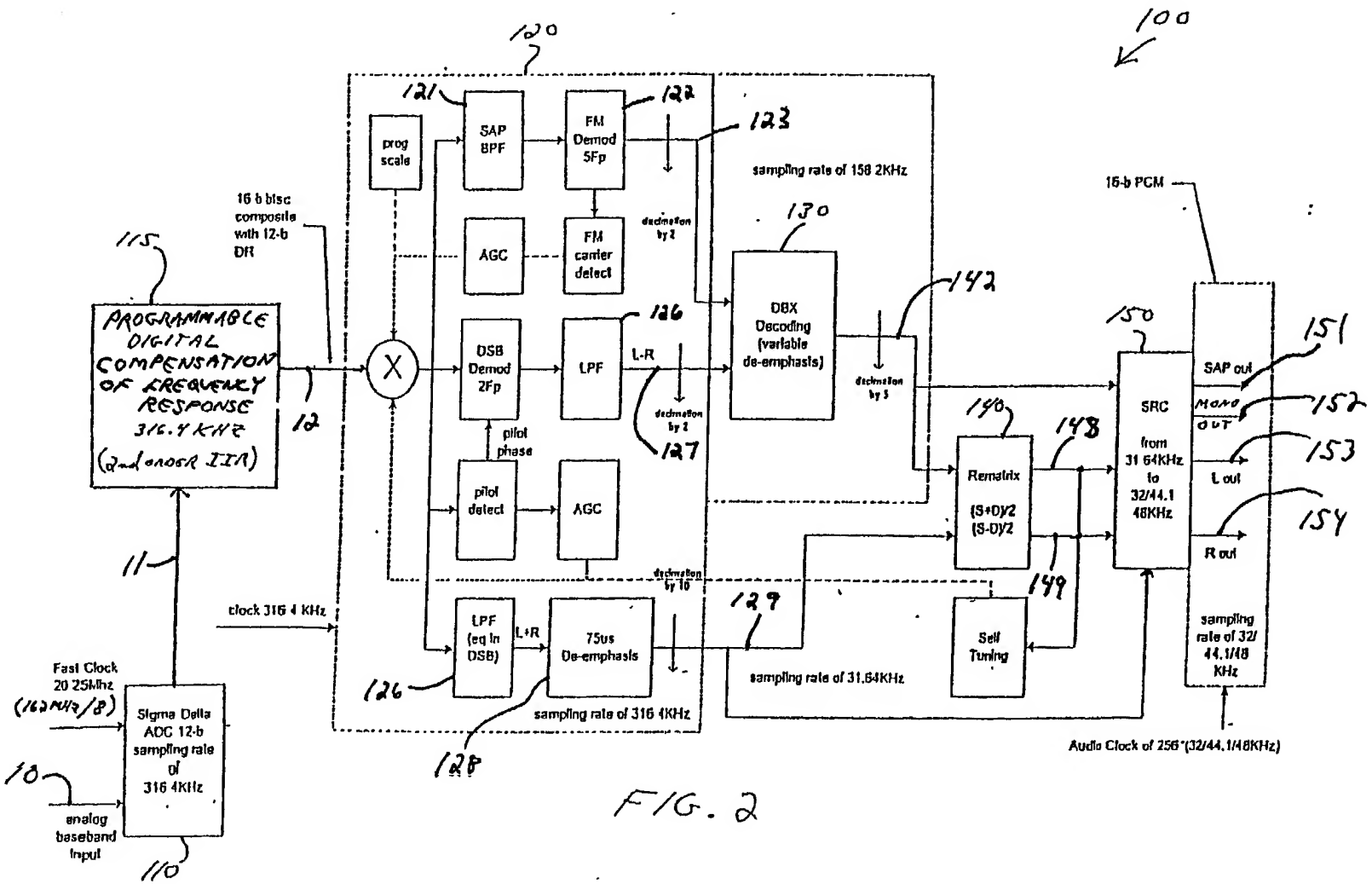
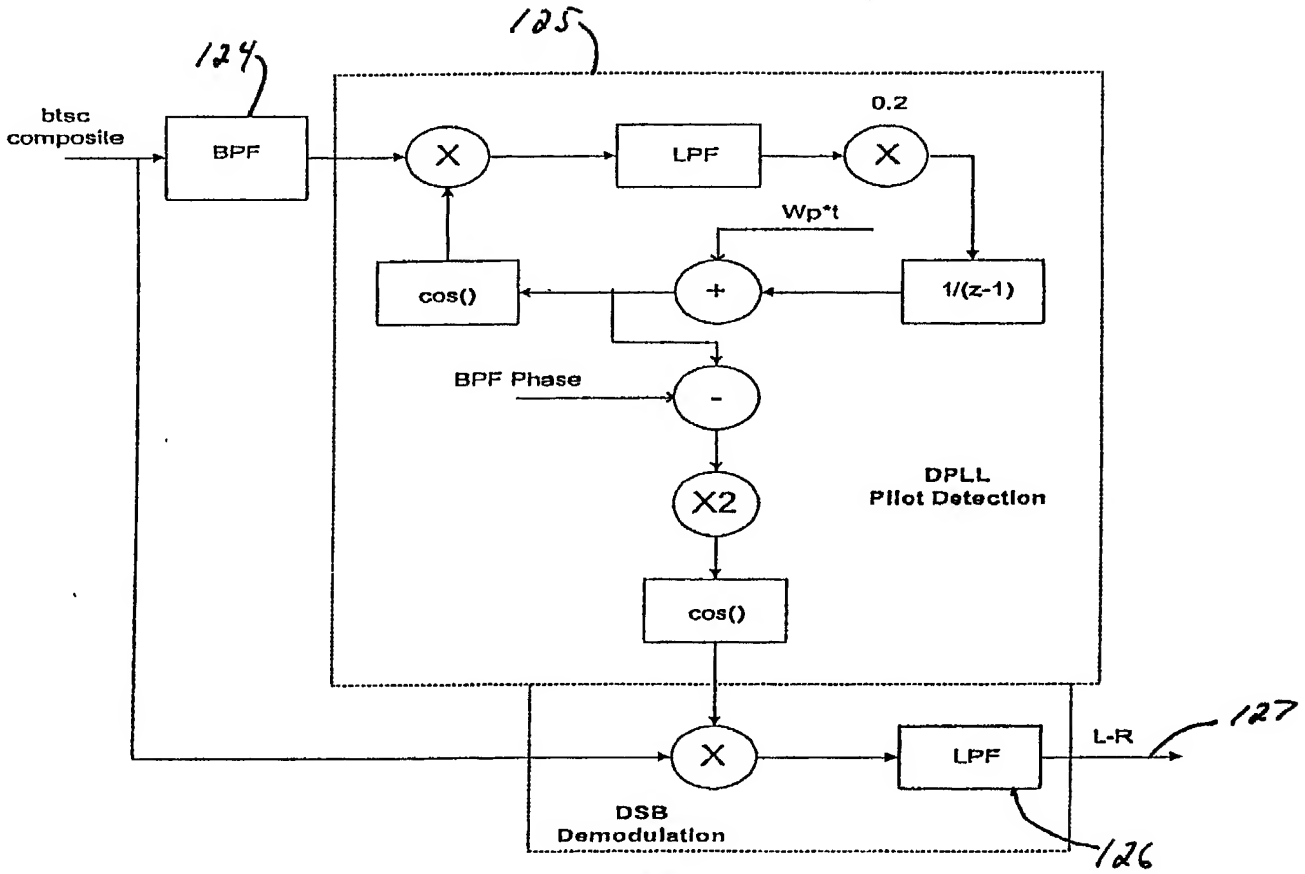


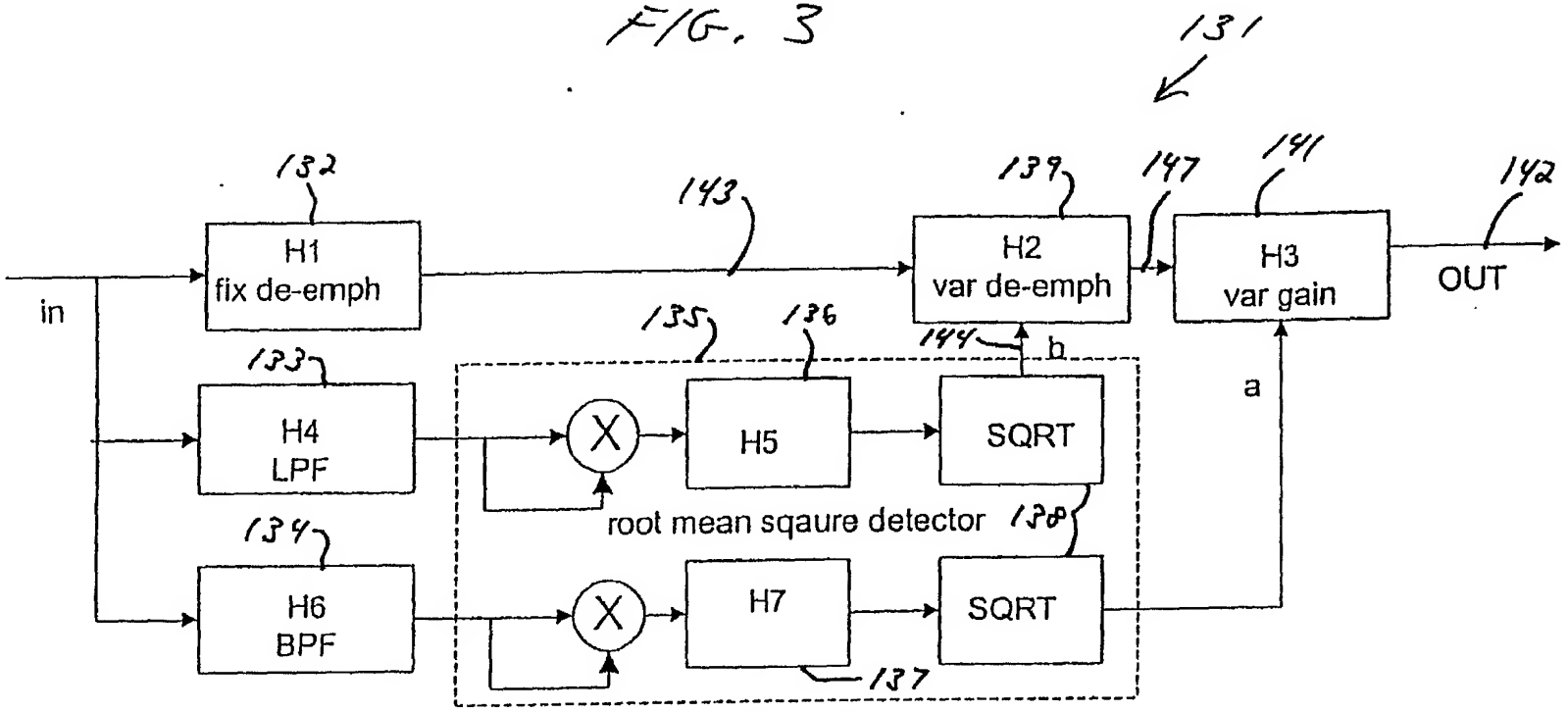
FIG. 2

FIG. 2B



Pilot Detection and DSB Demodulation

FIG. 3



DBX Decoding Transfer Function

FIG. 3B

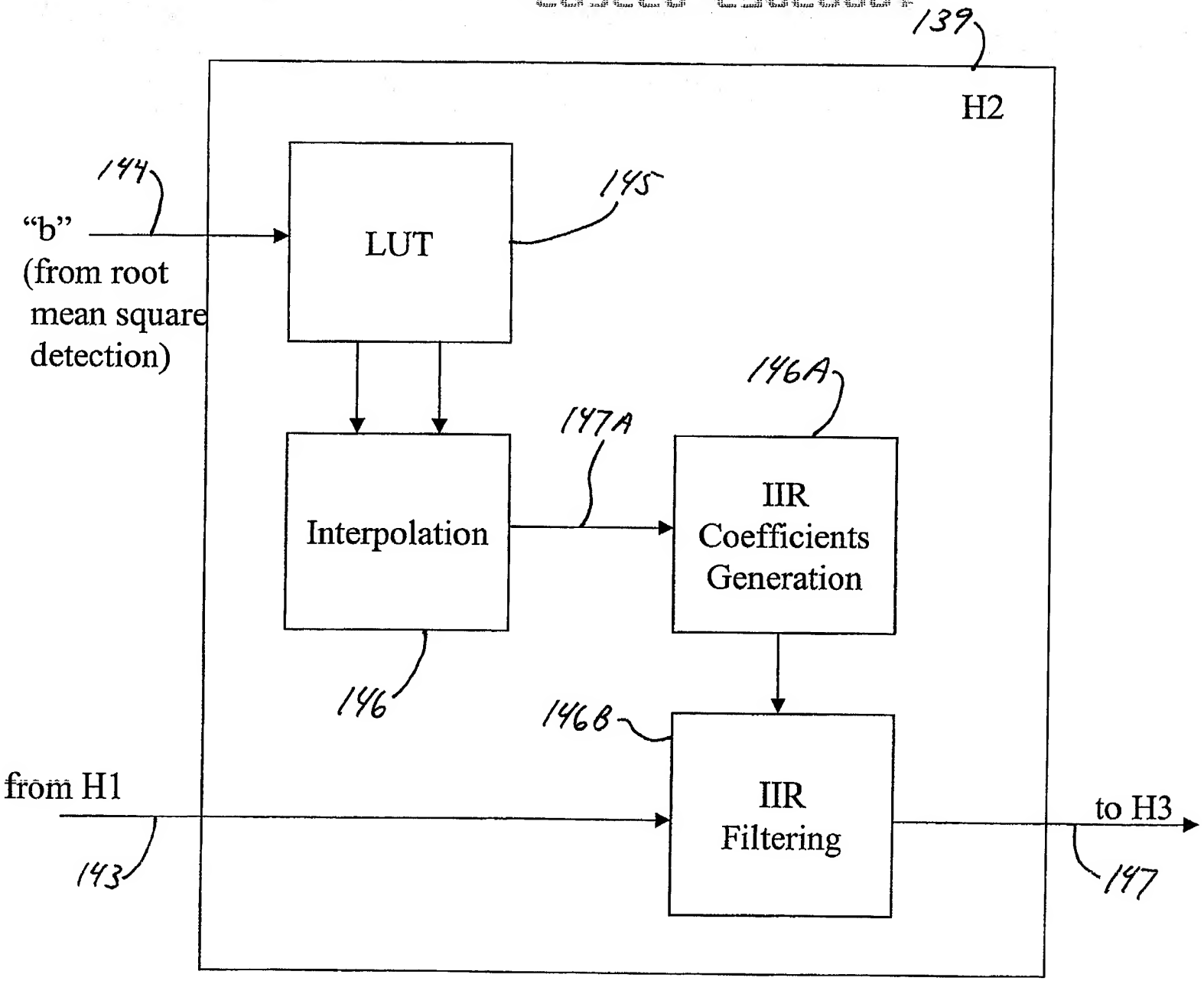

139
H2
144
"b"
(from root
mean square
detection)
LUT
145
146A
147A
Interpolation
IIR
Coefficients
Generation
146
146B
from H1
IIR
Filtering
to H3
143
147

FIG. 4

160

$$H1(s) = \frac{\frac{s}{5.23 \times 2\pi} + 1}{\frac{s}{0.408 \times 2\pi} + 1} \times \frac{\frac{s}{62.5 \times 2\pi} + 1}{\frac{s}{2.19 \times 2\pi} + 1}$$

$$H2(s) = \frac{1 + \left(\frac{s}{20.1 \times 2\pi}\right)\left(\frac{b + 51b}{b + 1}\right)}{1 + \left(\frac{s}{20.1 \times 2\pi}\right)\left(\frac{1 + 51}{b + 1}\right)}$$

$$H3(s) = a$$

$$H4(s) = \frac{\left(\frac{2}{7.66 \times 2\pi}\right)^2}{\left[\left(\frac{s}{7.66 \times 2\pi}\right)^2 + \left(\frac{s}{7.31 \times 2\pi}\right) + 1\right]} \times \frac{1}{\left[\left(\frac{s}{26.9 \times 2\pi}\right) + 1\right]} \times \frac{\left(\frac{s}{3.92 \times 2\pi}\right)}{\left[\left(\frac{s}{3.92 \times 2\pi}\right) + 1\right]}$$

$$H5(s) = \frac{a2}{s + a2}$$

$$H6(s) = \frac{\left(\frac{s}{0.0354 \times 2\pi}\right)}{\left(\frac{s}{0.0354 \times 2\pi} + 1\right)\left(\frac{s}{2.09 \times 2\pi} + 1\right)}$$

$$H7(s) = \frac{a1}{s + a1}$$

165

$$H1(z) = \frac{(0.0857 - 0.0696z^{-1})(0.0909 - 0.0076z^{-1})}{(1.0 - 0.9839z^{-1})(1.0 - 0.9167z^{-1})}$$

165A → $$H2(z) = \frac{(103*b+3) - z^{-1}(101*b+1)}{(3*b+103) - z^{-1}(b+101)}$$

$$H3(z) = a$$

$$H4(z) = \frac{0.5715 * 0.45085 * (1 - z^{-1})^3}{(1.0 - 2.0 * 0.5997\, z^{-1} + 2.0 * 0.1470\, z^{-2})(1.0 - 2.0 * 0.8242\, z^{-1} + 2.0 * 0.3635\, z^{-2})}$$

$$H5(z) = \frac{0.047^2}{1 - 0.99945\, z^{-1}}$$

$$H6(z) = \frac{0.07959\,(1 - z^{-2})}{1 - 2.0 * 0.9595\, z^{-1} + 2.0 * 0.4595\, z^{-2}}$$

$$H7(z) = \frac{0.02699^2}{1 - 0.9998\, z^{-1}}$$

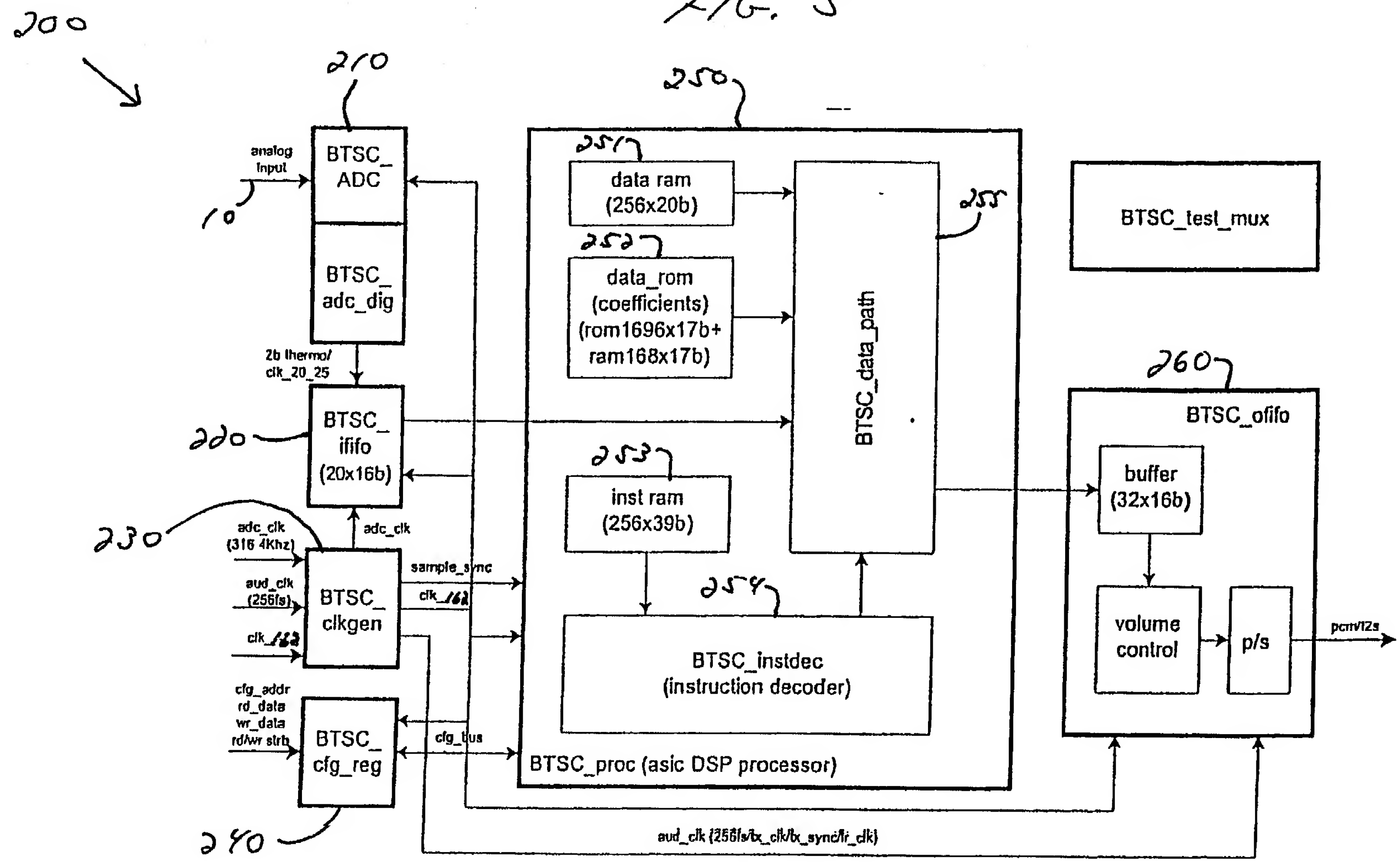
The square root calculation is done through the following equation

$$y[0] = 0.66667 * sq\_in + 0.354167$$

$$sqrt = coef12 * (sq\_in - y[0] * y[0]) + y[0]$$

THE value of sq_in is between 1.0 to 0.25, and coef12 is one of 12 coefficients chosen based on sq_in.

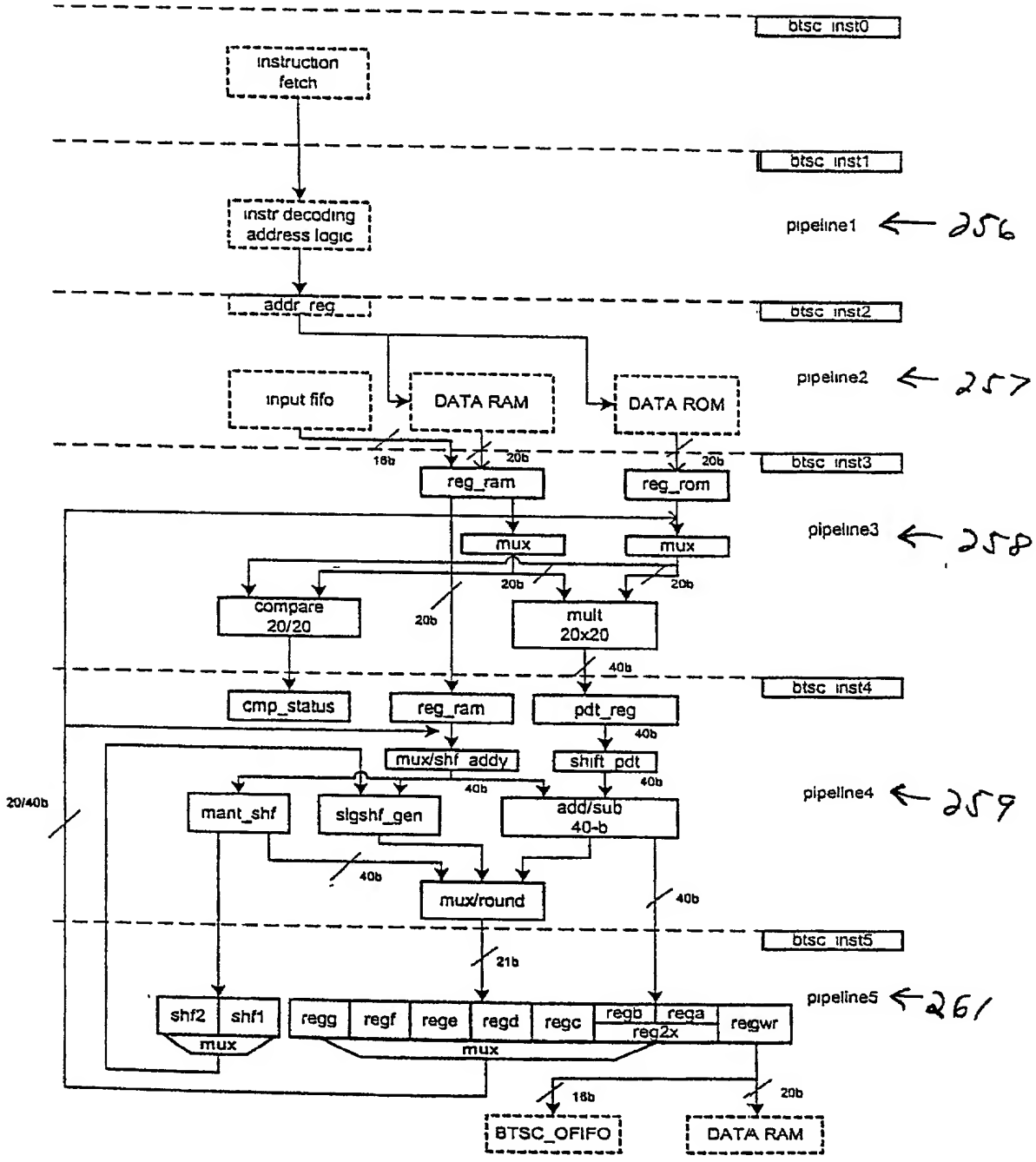
FIG. 5



200
210
250
BTSC_ADC
BTSC_adc_dig
analog input
10
2b thermo/ clk_20_25
BTSC_ififo (20x16b)
220
adc_clk
230
adc_clk (316 4Khz)
aud_clk (256fs)
clk_162
BTSC_clkgen
sample_sync
cfg_addr
rd_data
wr_data
rd/wr strb
BTSC_cfg_reg
cfg_bus
240
251
data ram (256x20b)
252
data_rom (coefficients) (rom1696x17b+ ram168x17b)
253
inst ram (256x39b)
254
BTSC_instdec (instruction decoder)
BTSC_data_path
255
BTSC_proc (asic DSP processor)
BTSC_test_mux
260
BTSC_ofifo
buffer (32x16b)
volume control
p/s
pcm/i2s
aud_clk (256fs/tx_clk/tx_sync/lr_clk)

255

FIG. 6



Data Path of the Processor

300

FIG. 7

301

302

code	instruction	cycles	description
0	nop	1	no operation
1	mant	1	mantissa and exponent generation from 40-b register
2	sigshf	1	convert from mantissa and exponent to fixed-point signal
3	mults	1	multiplication and subtraction
4	multa	1	multiplication and add
5	fos	3	micro code do 20-b 1st order IIR filter which is made of 3 mults/multa
6	sos	5	micro code does 20-b 2nd order IIR filter which is consisted of 5 multa/mults
7	rms	6	micro code does 20b square and 40-b 1st order IIR filter, which is consisted of 6 mults/multa
8	halt	1	halt programe
9	setli	1	setup inner loop
10	setlo	1	setup outer loop
11	jmpif	1	conditional jump
12	call	1	call routine
13	cmp	1	compare two register value and store 1-b result in status register
14	fos2	6	micro code does 40-b 1s order IIR filter which is consisted of 6 mults/multa
15	dload	1	directly store coded data to register or ram location